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REAL WAGES IN RECENT YEARS ¹

Those who are inclined to argue that the real wages index numbers of the Bureau of Labor report² of July, 1908, furnish grounds for optimism on the part of the laborer (and there were and possibly still are many such) have a worthy opponent in Dr. I. M. Rubinow. Eliminating the fluctuations by use of the moving average,³ this writer, in the *AMERICAN ECONOMIC REVIEW* for December, 1914, shows that in the trend of the series there is little encouragement to be found for the laborer. Dr. Rubinow is not willing to stop here, however. Taking advantage of certain later data, he has computed a series of index numbers purporting to show the trend of real wages from 1890 to 1912. In attempting this task he had certain difficulties to face. In the first place, the Bureau of Labor in 1908 ceased publishing information concerning either retail prices or wages. And it was not until 1912 (Bulletin No. 105) that a continuation was made of the study of these matters. For certain reasons when this work was continued the retail prices of only 15 articles of food from some 39 of the more important cities (instead of 30 articles from 68 localities as had been the case with the old series) were studied. An index, however, representing the price of these 15 articles running over the period 1890-1912 was constructed. Changes were also made in the form of presentation

¹ A critique of Dr. I. M. Rubinow's article on "The Recent Trend of Real Wages," published in the *AMERICAN ECONOMIC REVIEW*, vol. IV (December, 1914), p. 791.

² Bulletin No. 77. The series is as follows:

Year	Index	Year	Index
1890.....	98.6	1899.....	101.7
1891.....	97.1	1900.....	103.0
1892.....	99.4	1901.....	100.7
1893.....	96.9	1902.....	98.5
1894.....	98.0	1903.....	101.8
1895.....	100.6	1904.....	100.4
1896.....	104.2	1905.....	101.4
1897.....	103.0	1906.....	102.4
1898.....	101.2	1907.....	101.5

³ Series known as the moving average is as follows:

Five-year period	Index	Five-year period	Index
1890-1894.....	98.0	1897-1901.....	101.9
1891-1895.....	98.4	1898-1902.....	101.0
1892-1896.....	99.8	1899-1903.....	101.1
1893-1897.....	100.5	1900-1904.....	100.8
1894-1898.....	101.4	1901-1905.....	100.8
1895-1899.....	102.1	1902-1906.....	100.7
1896-1900.....	102.6	1903-1907.....	100.8

of the wage data, no index running over the whole period with the average of 1890-1899 as a base being computed. Fortunately enough information was given to enable Dr. Rubinow to construct such an index.⁴ Using these figures in conjunction with the new index numbers of the retail prices, he computes a series representing real wages over the period 1890-1912. Table 1, taken from his article,⁵ brings his figures together. Chart I, accompanying it, presents graphically his findings.

TABLE 1.—COMPUTATION OF INDEX OF REAL WAGES, 1890-1912.¹

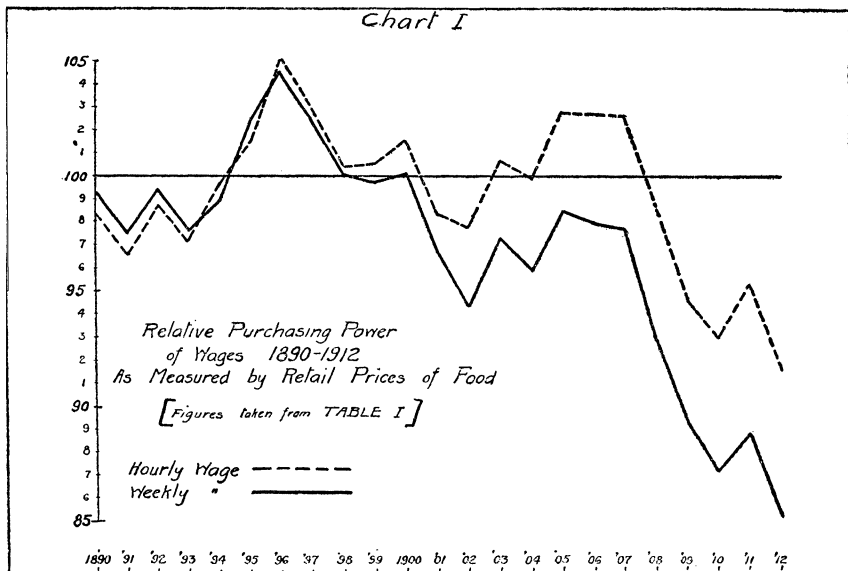
Year	Hours per week	Wages per hour	Full time weekly earnings per employee	Retail prices of food	Purchasing power measured by retail prices of food	
					Hourly wage	Weekly wage
1890	100.1	100.2	101.3	101.9	98.3	99.4
1891	100.9	99.9	100.8	103.4	96.6	97.5
1892	100.7	100.3	101.0	101.6	98.7	99.4
1893	100.4	101.2	101.6	104.1	97.2	97.6
1894	99.2	98.9	98.1	99.2	99.7	98.9
1895	99.8	98.6	99.2	97.1	101.5	102.2
1896	99.7	100.0	99.7	95.2	105.0	104.7
1897	99.5	99.6	99.1	96.7	103.0	102.5
1898	99.6	100.2	99.8	99.7	100.5	100.1
1899	99.2	101.4	100.6	100.8	100.6	99.8
1900	98.6	104.7	103.2	103.0	101.6	100.2
1901	98.1	107.0	105.0	108.5	98.6	96.8
1902	97.4	112.0	109.1	114.6	97.7	94.3
1903	96.7	115.5	111.7	114.7	100.7	97.3
1904	96.0	116.3	111.6	116.2	100.0	96.0
1905	96.0	119.6	114.8	116.4	102.8	98.6
1906	95.4	123.6	117.9	120.3	102.7	98.0
1907	95.1	129.3	123.0	125.9	102.7	97.7
1908	94.5	128.5	121.4	130.1	98.8	93.0
1909	94.4	129.9	122.6	137.2	94.7	89.4
1910	93.8	134.0	125.7	144.1	93.0	87.2
1911	93.3	136.3	127.2	143.0	95.3	88.9
1912	93.0	141.5	131.6	154.2	91.8	85.3

¹ Taken from page 811 of Dr. Rubinow's article.

These figures even more than the ones previously computed by the Bureau of Labor offer the wage-earner small cause for rejoicing. And yet the data from which these figures are computed leave, we are forced to admit, much to be desired. No one, perhaps, more than Dr. Rubinow himself realizes the need of caution

⁴ For detailed information as to method of procedure see *AMERICAN ECONOMIC REVIEW*, vol. IV, pp. 793-817.

⁵ P. 811.



in drawing conclusions from data so limited. He warns us as follows:⁶

Before these sweeping conclusions may be accepted, their general trustworthiness should be carefully scrutinized. It will be argued with justice that they are based upon an indifferent assortment of statistical data. Even up to 1907 the "index of real wages" derived from the above table is much more gloomy than the official index published in Bulletin 77 for the last time. . . .

It is necessary, therefore, to examine the table⁷ critically comparing it column by column with the similar table published in Bulletin 77 (p. 7). Such an examination will show that the index of "hours of labor," although independently computed here, is practically identical with the official index (in 1907, 95.1 against 95.0). The same is true of the index of wages per hour (129.3 as against 128.8 in 1907); and as a result the derivative indexes of "full time weekly wages" are not very far apart (in 1907, 123.0 against 122.4).

The real difference is found in the "retail prices of food" (in 1907, 125.9 against 120.6 in the old index). This difference, however, it will be remembered, has not been introduced by the writer. It is the new "official" index of Bulletin 105 as compared with the old "official" index of Bulletin 77.

And he also says:⁸

⁶ P. 812.

⁷ See Table I, p. 320.

⁸ P. 801.

It is possible that the omitted articles⁹ are those which have not risen in price quite as violently as some of those retained. The prices of coffee, tea, molasses, rice, prunes, salt beef or pork, etc., have surely not been so sensitive to price increase as were sirloin steak, pork chops, or strictly fresh eggs. It may be questioned how far *any changes* in the price of such luxuries as sirloin steak, pork chops, and eggs "strictly fresh," would affect the status of the wage-worker's family. From this point of view the earlier figures would appear to be somewhat more reliable, yet we have the official statement of the bureau (Bulletin 105, p. 6) that "these fifteen articles represent approximately two thirds of the expenditures for food by the average workingman's family."

The present writer, therefore, no more desires to make, than he feels prepared to sustain, a sweeping condemnation of Dr. Rubinow's study. He has only praise for the work. The importance and timeliness of Dr. Rubinow's subject, and the shadow of suspicion cast upon his results by their difference from the old series, prompts the desire, however, to "scrutinize carefully the general trustworthiness of the figures." The preparation of his wage index, though accomplished by combining what would seem rather heterogeneous material, was by him step by step carefully scrutinized and cautiously done, and, on the whole, would seem above serious criticism. The credibility of the series is also greatly enhanced by its close correspondence with the older index.¹⁰ It appears reasonably probable, therefore, that the wage figures are fairly representative.

With the relative prices of food, however, the situation is somewhat different. Here not only have we a very limited list of

⁹ (a) Articles quoted up to 1907, and also for 1907-1913:

1 Sugar, granulated	6 Lard, pure	11 Sirloin steak
2 Wheat flour	7 Corn meal	12 Ham, smoked
3 Butter, creamery	8 Eggs, strictly fresh	13 Pork chops
4 Milk, fresh	9 Hens	14 Bacon, smoked
5 Rib roast	10 Round steak	15 Potatoes, Irish

(b) Articles quoted up to 1907, but omitted for 1907-1913:

1 Coffee	6 Molasses	11 Prunes
2 Tea	7 Beef, salt	12 Fish, salt
3 Veal	8 Beans, dry	13 Mutton
4 Vinegar	9 Pork, salt	14 Apples, evaporated
5 Bread, wheat	10 Fish, fresh	15 Rice

¹⁰ I am aware of the criticism that can with truth be made that the figures are "full time" wages, and thus cannot be taken as a measure of actual income of the wage-earner who may not be able to find full time employment. Yet in the absence of figures with regard to unemployment, the study of the full time wage may be recognized as worth while.

articles included—a fact in itself justifying some skepticism as to the representativeness of the material—but our suspicions are also aroused by the knowledge that the new index covering the 15 articles by no means agrees with the older list covering 30. Is there no way by which we may test the trustworthiness of this new series? A comparative study of the two index series may throw some light on the subject. Proceeding, let us first discover, if we may, why the two series differ. Since the two are based on the same price lists, the difference must be due either to the difference in methods of computation¹¹ used, or to the fact that the old series includes articles which the new one omits. In principle the two methods are essentially different, and in general the later method is certainly to be preferred. The question confronting us, however is, Has the difference in methods given rise in this case to substantially different results?

To recompute the old series using the new method is, of course, out of the question. A comparison of the relative price of several individual articles as computed by the old and by the new method is given in Table 2. Each of these relative prices was made up from several quotations. A glance at the table shows that the difference in no case is significant. When the variation in methods gives rise to no significant differences in the relative prices of the individual articles, although in the case of each article the price was compounded of numerous samples, it is not likely that any serious discrepancy in the series as a whole would be due to method. To this evidence add the fact that for a period of eight years the old and new series almost coincide, although the differing methods apply to the whole period, and it is obvious that we must look elsewhere for the cause of the difference in the curves. On the other hand, what evidence, other than general impressions regarding prices, have we that the divergence is due to “a one-sided selection of articles”? To answer this question I have prepared series of indexes¹² covering the omitted articles (see Table 3).

¹¹ For the reasons for change in method of computation and the difference in the methods see Bulletin No. 156, p. 364.

¹² The series was obtained by striking a simple average of the indexes of the 15 omitted articles. In the light of facts presented above as to the accuracy of the old and new methods I feel that no serious error has been introduced in this computation. It is shown in Bulletin No. 77 that there is no significant difference between the weighted and the simple average in the old series. I have assumed that the simple average in our case was reasonably accurate.

TABLE 2.—RELATIVE RETAIL PRICES OF SEVERAL ARTICLES AS COMPUTED BY OLD AND NEW METHODS.
O. S. signifies Old Series; N. S. signifies New Series.

Year	Butter		Flour, wheat		Lard		Poultry		Eggs		Corn meal		Potatoes, Irish	
	O. S.	N. S.	O. S.	N. S.	O. S.	N. S.	O. S.	N. S.	O. S.	N. S.	O. S.	N. S.	O. S.	N. S.
1890	99.2	99.2	109.7	110.2	98.2	98.5	101.3	102.8	100.6	100.3	100.0	101.3	109.3	109.0
1891	106.4	105.7	112.5	112.4	99.8	100.0	104.0	104.8	106.9	105.6	109.7	111.5	116.6	117.1
1892	106.8	106.8	105.1	104.0	103.6	104.4	103.8	104.2	106.8	105.3	105.2	107.7	95.7	95.4
1893	109.9	108.6	96.1	95.1	117.9	119.2	104.2	104.3	108.1	105.5	103.1	104.0	112.3	111.8
1894	101.7	102.0	88.7	88.3	106.9	106.4	98.6	98.2	96.3	97.4	102.2	104.4	102.6	101.8
1895	97.0	97.4	89.0	89.6	100.1	99.8	98.4	97.3	99.3	98.8	100.8	101.0	91.8	90.6
1896	92.7	93.1	92.7	94.2	92.5	92.1	97.1	96.1	92.8	90.3	95.0	92.8	77.0	78.8
1897	93.1	93.7	104.3	104.7	89.8	89.0	94.0	92.3	91.4	94.0	93.7	91.2	93.0	92.5
1898	95.1	95.8	107.4	106.9	93.9	93.5	96.8	96.8	96.2	97.9	95.0	92.9	105.4	103.9
1899	97.7	97.6	94.6	94.8	97.1	97.1	101.8	103.4	101.1	101.6	95.1	92.9	96.1	98.8
1900	101.4	101.2	94.3	94.6	104.4	104.9	100.8	99.6	99.9	99.1	97.4	95.6	93.5	92.8
1901	103.2	103.0	94.4	94.9	118.1	119.6	103.0	105.0	105.7	107.7	107.1	107.6	116.8	114.0
1902	111.5	109.8	94.9	95.6	134.3	135.6	113.2	113.6	119.1	119.4	118.8	123.9	117.0	116.7
1903	110.8	110.2	101.2	102.1	126.7	126.0	118.5	119.3	125.3	125.1	120.7	123.1	114.8	114.7
1904	109.0	108.1	119.9	118.3	117.3	116.3	120.7	120.6	130.9	131.1	121.5	122.9	121.3	119.0
1905	112.7	111.4	119.9	118.6	116.6	115.8	123.6	123.6	131.6	131.3	122.2	123.5	110.2	109.3
1906	118.2	118.3	108.1	108.3	128.0	127.3	129.1	128.0	134.2	134.2	123.2	124.5	114.4	114.6
1907	127.6	127.3	117.7	118.2	134.2	133.5	131.4	131.3	137.7	138.2	131.6	133.5	120.6	122.2

TABLE 3.—COMPUTATION OF SERIES INCLUDING THE OMITTED FIFTEEN ARTICLES.

Year	Coffee	Tea	Veal	Vinegar	Molasses	Beef, salt	Beans, dry	Fish, fresh	Salt fish	Mutton	Apples, evaporated	Rice	Prunes	Pork, salt	Average
1890	103.4	100.0	98.8	102.9	104.7	97.5	103.3	99.3	100.7	100.7	109.0	101.3	116.8	95.3	102.6
1891	103.2	100.4	99.6	105.5	101.7	98.3	106.2	99.6	101.7	100.6	110.3	102.5	116.5	98.9	103.4
1892	103.8	100.2	100.0	102.7	101.2	99.5	102.4	100.1	102.2	101.0	99.3	101.3	113.5	100.5	102.0
1893	104.8	100.1	100.0	99.5	100.6	100.3	105.0	100.1	103.4	99.9	107.0	98.4	115.6	108.7	103.1
1894	103.3	98.7	98.7	99.8	100.3	98.9	102.8	100.4	101.5	97.8	105.8	99.0	100.9	103.4	100.8
1895	101.7	98.5	98.5	98.9	99.0	99.6	100.5	99.8	98.9	98.7	97.4	98.8	94.2	99.2	98.8
1896	99.6	98.8	99.5	97.2	98.7	99.8	92.7	100.2	97.5	98.7	88.6	96.7	86.8	95.5	96.4
1897	94.5	98.5	99.9	97.4	97.7	100.9	91.5	99.8	95.2	99.6	87.8	97.9	84.3	97.3	95.9
1898	91.1	100.7	101.2	97.9	97.9	102.1	95.9	100.5	98.8	100.4	95.4	101.7	86.3	99.1	97.8
1899	90.5	104.4	103.7	98.3	98.2	103.2	99.7	100.2	100.2	102.6	99.5	102.4	85.1	101.8	99.3
1900	91.1	103.5	104.9	98.5	102.2	103.7	110.0	100.4	99.1	105.6	95.2	102.4	83.0	107.7	100.7
1901	90.7	106.7	108.8	98.9	101.3	106.1	113.9	101.4	100.9	109.0	96.8	103.5	82.6	117.5	102.7
1902	89.6	107.2	115.2	99.5	102.1	116.0	116.8	105.0	102.8	114.7	104.4	103.5	83.4	132.5	106.6
1903	89.3	106.0	114.9	99.1	103.8	108.8	118.1	107.3	108.4	112.6	100.8	103.9	80.2	129.0	105.9
1904	91.8	105.8	115.5	98.9	104.0	108.3	116.8	107.9	111.7	114.1	99.2	101.6	79.6	125.8	105.8
1905	93.6	105.7	117.7	100.3	104.4	107.9	116.3	109.9	113.8	117.8	116.0	102.6	81.4	126.0	107.4
1906	94.7	105.5	123.2	102.6	105.3	110.8	115.2	116.2	116.8	124.1	105.6	105.7	85.1	136.9	111.3
1907	95.0	105.3	125.0	104.5	107.7	114.1	118.8	120.6	121.6	130.1	124.6	108.5	88.4	141.2	114.7

The old series, the new series covering 15 articles, and my own series covering the omitted 15 articles have been brought together in Table 4 and graphically presented on Chart II. It will be readily seen that just at the time (about 1897) when the new series begins to rise above the old one, the series representing the

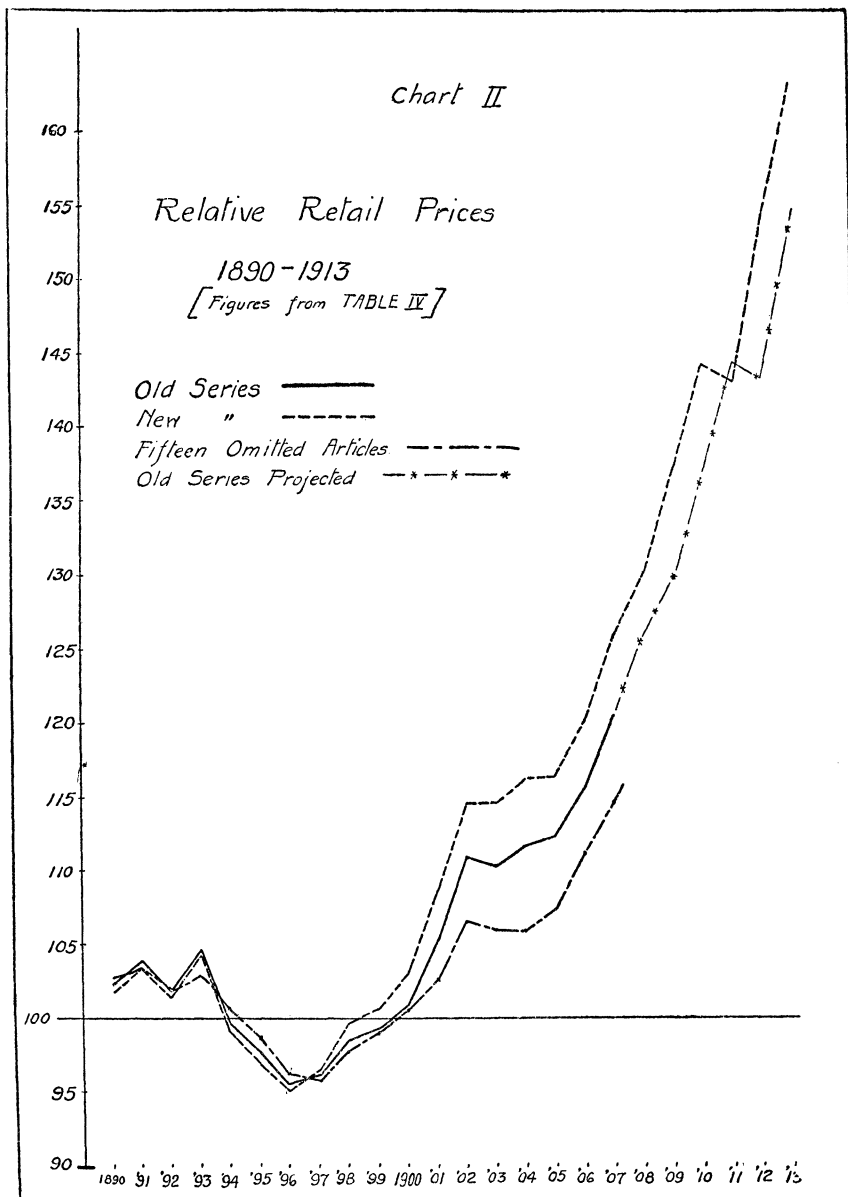


TABLE 4.—COMPARISON OF THE NEW SERIES, THE OLD SERIES, AND THE SERIES REPRESENTING THE OMITTED FIFTEEN ARTICLES.

Year	New series (15 articles)	Old series (30 articles)	Series covering the omitted 15 articles
1890	101.9	102.4	102.6
1891	103.4	103.8	103.4
1892	101.6	101.9	102.0
1893	104.1	104.4	103.1
1894	99.2	99.7	100.8
1895	97.1	97.8	98.8
1896	95.2	95.5	96.4
1897	96.7	96.3	95.9
1898	99.7	98.7	97.8
1899	100.8	99.5	99.3
1900	103.0	101.1	100.7
1901	108.5	105.2	102.7
1902	114.6	110.9	106.6
1903	114.7	110.3	105.9
1904	116.2	111.7	105.8
1905	116.4	112.4	107.4
1906	120.3	115.7	111.3
1907	125.9	120.6	114.7
1908	130.1		
1909	137.2		
1910	144.1		
1911	143.0		
1912	154.2		
1913	163.4		

15 omitted articles begins to fall below it, and at about the same rate. The evidence, therefore, would appear to be convincing that the "one-sided selection of articles" is responsible for the difference between the new and old series.

What, then, are we to say with regard to the representativeness of the new series? We have, on the one hand, the statement of the Bureau of Labor that "these fifteen articles (included in the new series) represent approximately two thirds of the expenditures for food by the average workingman's family." We know, on the other hand, that the information on which this statement was based was gathered in 1901, and in a population so changing in composition as is ours, it is at least a question whether the habits of living have remained relatively the same over this period of ten or more years. It would certainly be strange if the workman's diet remained unchanged when substitutes for the increasingly costly articles were to be had at prices that had not risen. But even waiving these matters, we should have to face the fact that materials representing one third of the food expenditures of

laborers were to be found on the list of "omitted articles." These considerations would seem to lead us almost inevitably to the conclusion that the new series is not an altogether accurate measure of the relative prices of the food consumed by laborers.

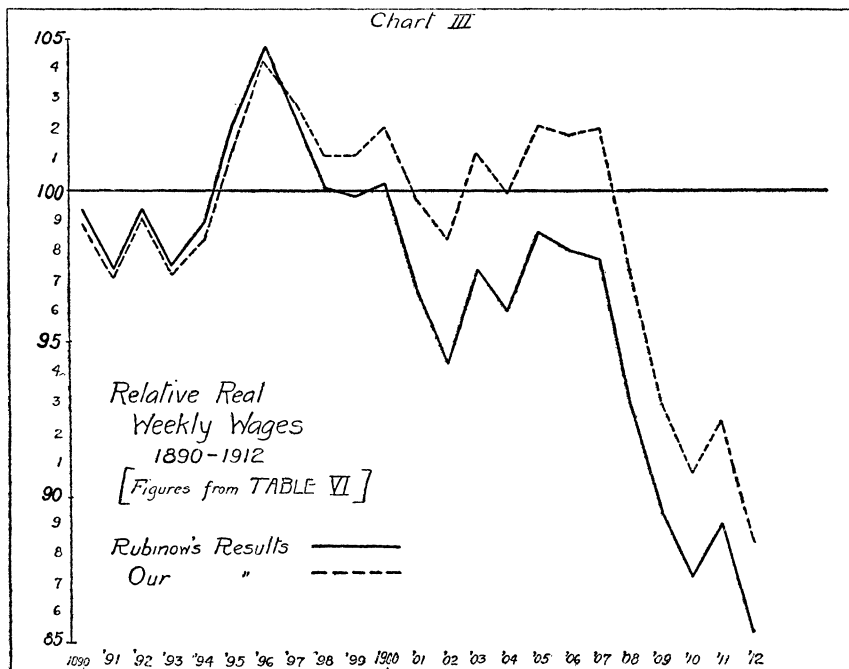
If this reasoning be just, it would seem that Dr. Rubinow's results, based as they are upon the newer and more radical series, exaggerate somewhat the gloom of the situation. To stop, however, with simply a criticism of Dr. Rubinow's results would accomplish little. Can we not go farther and construct from existing data a series which shall be somewhat more representative? I think this can be done. From 1890 to 1907 we have the old series computed by the Bureau of Labor which, in the light of the above discoveries, and also from the very fact that it represents 30 articles instead of 15, would seem more representative of the facts. But what of the years subsequent to 1907? Turning to Chart III we note that the series covering the omitted articles, after dropping well below both the others, by 1902 runs a course parallel to them as far as we have the data. What general in-

TABLE 5.—COMPUTATION OF RECENT REAL WAGE INDEX SERIES.

Year	Hours per week	Wages per hour	Full time weekly earnings per employee	Retail prices (old series)	Purchasing power of wages as measured by retail prices of food	
					Hourly wage	Weekly wage
1890	101.1	100.2	101.3	102.4	97.9	98.9
1891	100.9	99.9	100.8	103.8	96.2	97.1
1892	100.7	100.3	101.0	101.9	98.4	99.1
1893	100.4	101.2	101.6	104.4	96.9	97.8
1894	99.2	98.9	98.1	99.7	99.2	98.4
1895	99.8	98.6	99.2	97.8	100.8	101.4
1896	99.7	100.0	99.7	95.5	104.7	104.4
1897	99.5	99.6	99.1	96.3	103.4	102.9
1898	99.6	100.2	99.8	98.7	101.5	101.1
1899	99.2	101.4	100.6	99.5	101.9	101.1
1900	98.6	104.7	103.2	101.1	103.6	102.1
1901	98.1	107.0	105.0	105.2	101.7	99.8
1902	97.4	112.0	109.1	110.9	101.0	98.4
1903	96.7	115.5	111.7	110.3	104.7	101.3
1904	96.0	116.3	111.6	111.7	104.1	99.9
1905	96.0	119.6	114.8	112.4	106.4	102.1
1906	95.4	123.6	117.9	115.7	106.8	101.9
1907	95.1	129.3	123.0	120.6	107.2	102.0
1908	94.5	128.5	121.4	124.8	103.0	97.8
1909	94.4	129.9	122.6	131.9	98.5	92.9
1910	93.8	134.0	125.7	138.8	96.5	90.6
1911	93.3	136.3	127.2	137.7	99.0	92.4
1912	93.0	141.5	131.6	148.9	95.0	88.4

TABLE 6.—COMPARISON OF REVISED RESULTS WITH DR. RUBINOW'S.

Year	Hourly wage		Weekly wage	
	Rubinow's series	Revised series	Rubinow's series	Revised series
1890	98.3	97.9	99.4	98.9
1891	96.6	96.2	97.5	97.1
1892	98.7	98.4	99.4	99.1
1893	97.2	96.9	97.6	97.3
1894	99.7	99.2	98.9	98.4
1895	101.5	100.8	102.2	101.4
1896	105.0	104.7	104.7	104.4
1897	103.0	103.4	102.5	102.9
1898	100.5	101.5	100.1	101.1
1899	100.6	101.9	99.8	101.1
1900	101.6	103.6	100.2	102.1
1901	98.6	101.7	96.8	99.8
1902	97.7	101.0	94.3	98.4
1903	100.7	104.7	97.3	101.3
1904	100.0	104.1	96.0	99.9
1905	102.8	106.4	98.6	102.1
1906	102.7	106.8	98.0	101.9
1907	102.7	107.2	97.7	102.0
1908	98.8	103.0	93.0	97.3
1909	94.7	98.5	89.4	92.9
1910	93.0	96.5	87.2	90.6
1911	95.3	99.0	88.9	92.4
1912	91.8	95.0	85.3	88.4
1913				



formation we have regarding prices would lead us to think that coffee, tea, molasses, rice, prunes, salt beef or pork, etc., have not risen in price since 1907 as did sirloin, pork chops, or strictly fresh eggs, *i. e.*, that the omitted articles surely have not risen since 1907 at a greater rate than did the articles on the new list. If we are safe in making this guess—that omitted articles have not risen at a *greater* rate—we are afforded a convenient and, I think, not inaccurate method of estimating the course of the prices of the 30 articles. If the new series and the relative prices of the omitted articles are to continue their parallel course, the series representing the 30 articles must keep its intermediate position. So by continuing the curve representing the old series in a course parallel to that of the new series we should have a pretty close estimate of its true course. And, although this curve represents no actual data, I am inclined to believe that it is closer to the truth than the new series. By extending the curve on Chart II and using, in conjunction with Dr. Rubinow's wage series, the figures thus derived, it has been possible, in Table 5, to compute an index series representing real wages from 1890 to 1912. Table 6 and Chart III show the recent course of real weekly wages as computed by Dr. Rubinow and as I have computed them.¹³

It is evident that the results thus obtained do not present so gloomy a picture as Dr. Rubinow's. Nevertheless, it is quite clear that, even if we discard altogether the more radical new series and depend upon a more conservative series thus obtained, there is nothing in the facts—as far as these figures may be taken as representative of the facts—which can give the wage-worker cause for rejoicing, and that the doctrine so popular in certain quarters that while the rich have grown rapidly richer in recent years the poor have also steadily risen in the scale of economic welfare, has no foundation in fact.

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¹³ The real hourly wage of my results shows approximately the same divergences from Dr. Rubinow's figures as does the real weekly wage. Therefore the series have not been plotted.